What Is Claimed Is:

1. A method for computing interval parameter bounds from fallible measurements, comprising:

receiving a set of measurements $z_1, \ldots, z_n$, wherein an observation model describes each z_i as a function of a p-element vector parameter $\mathbf{x} = (x_1, \ldots, x_p)$;

storing the set of measurements $z_1, \ldots, z_n$ in a memory in a computer system;

forming a system of nonlinear equations $z_i - h(\mathbf{x}) = 0$ $(i=1, \ldots, n)$ based on the observation model; and

solving the system of nonlinear equations to determine interval parameter bounds on $\mathbf{x}$.

2. The method of claim 1, wherein the system of nonlinear equations is an "overdetermined system" in which there are more equations than unknowns.

3. The method of claim 1, wherein each measurement z_i is actually a q-element vector of measurements $\mathbf{z}_i = (z_{i1}, \ldots, z_{iq})^T$, and h is actually a q-element vector of functions $\mathbf{h} = (h_1, \ldots, h_q)^T$.

4. The method of claim 1,

wherein receiving the set of measurements involves receiving values for a set of conditions $c_1, \ldots, c_n$ under which the corresponding observations z_i were made; and

wherein equations in the system of nonlinear equations account for the conditions c_i and are of the form $z_i - h(\mathbf{x} \mid c_i) = 0$ $(i=1, \ldots, n)$.

5. The method of claim 4, wherein each condition c_i is actually an r-element vector of conditions $\mathbf{c}_i = (c_{i1}, \ldots, c_{ir})^T$.

6. The method of claim 4, wherein each condition c_i is not known precisely but is contained within an interval c^I_i.

7. The method of claim 4, wherein equations in the system of nonlinear equations are of the form $z_i - h(\mathbf{x} \mid c_i) + \varepsilon^I(\mathbf{x}, c_i) = 0$ (i=1, …, n), which includes an error model $\varepsilon^I(\mathbf{x}, c_i)$ that provides interval bounds on measurement errors for z_i.

8. The method of claim 7, wherein if z_i is actually a q-element vector of measurements $\mathbf{z}_i = (z_{i1}, \ldots, z_{iq})^T$, then ε^I is actually a q-element vector $\boldsymbol{\varepsilon}^I = (\varepsilon_1, \ldots, \varepsilon_q)^T$.

9. The method of claim 7, wherein if there exists no solution to the system of nonlinear equations, the method further comprises determining that at least one of the following is true:

at least one of the set of measurements $z_i, \ldots, z_n$ is faulty;

the observation model $h(\mathbf{x} \mid c_i)$ is false;

the error model $\varepsilon^I(\mathbf{x}, c_i)$ is false; and

the computational system used to compute interval bounds on elements of $\mathbf{x}$ is flawed.

10. The method of claim 1, wherein solving the system of nonlinear equations involves:

linearizing the system of nonlinear equations to form a corresponding system of linear equations; and

solving the system of linear equations.

11. The method of claim 10, wherein solving the system of nonlinear equations involves using Gaussian Elimination.

12. A computer-readable storage medium storing instructions that when executed by a computer cause the computer to perform a method for computing interval parameter bounds from fallible measurements, the method comprising:

receiving a set of measurements $z_1, \ldots, z_n$, wherein an observation model describes each z_i as a function of a p-element vector parameter $\mathbf{x} = (x_1, \ldots, x_p)$;

storing the set of measurements $z_1, \ldots, z_n$ in a memory in a computer system;

forming a system of nonlinear equations $z_i - h(\mathbf{x}) = 0$ (i=1, …, n) based on the observation model; and

solving the system of nonlinear equations to determine interval parameter bounds on $\mathbf{x}$.

13. The computer-readable storage medium of claim 12, wherein the system of nonlinear equations is an "overdetermined system" in which there are more equations than unknowns.

14. The computer-readable storage medium of claim 12, wherein each measurement z_i is actually a q-element vector of measurements $\mathbf{z}_i = (z_{i1}, \ldots, z_{iq})^T$, and h is actually a q-element vector of functions $\mathbf{h} = (h_1, \ldots, h_q)^T$.

15. The computer-readable storage medium of claim 12, wherein receiving the set of measurements involves receiving values for a set of conditions $c_1, \ldots, c_n$ under which the corresponding observations z_i were made; and

wherein equations in the system of nonlinear equations account for the conditions c_i and are of the form $z_i - h(\mathbf{x} \mid c_i) = 0$ (i=1, …, n).

16. The computer-readable storage medium of claim 15, wherein each condition c_i is actually an r-element vector of conditions $\mathbf{c}_i = (c_{i1}, \ldots, c_{ir})^T$.

17. The computer-readable storage medium of claim 15, wherein each condition c_i is not known precisely but is contained within an interval c^I_i.

18. The computer-readable storage medium of claim 15, wherein equations in the system of nonlinear equations are of the form, $z_i - h(\mathbf{x} \mid c_i) + \varepsilon^I(\mathbf{x}, c_i) = 0$ (i=1, …, n), which includes an error model $\varepsilon^I(\mathbf{x}, c_i)$ that provides interval bounds on measurement errors for z_i.

19. The computer-readable storage medium of claim 18, wherein if z_i is actually a q-element vector of measurements $\mathbf{z}_i = (z_{i1}, \ldots, z_{iq})^T$, then ε^I is actually a q-element vector $\boldsymbol{\varepsilon}^I = (\varepsilon_1, \ldots, \varepsilon_q)^T$.

20. The computer-readable storage medium of claim 18, wherein if there exists no solution to the system of nonlinear equations, the method further comprises determining that at least one of the following is true:

at least one of the set of measurements $z_i, \ldots, z_n$ is faulty;

the observation model $h(\mathbf{x} \mid c_i)$ is false;

the error model $\varepsilon^1(\mathbf{x}, c_i)$ is false; and

the computational system used to compute interval bounds on elements of $\mathbf{x}$ is flawed.

21. The computer-readable storage medium of claim 12, wherein solving the system of nonlinear equations involves:

linearizing the system of nonlinear equations to form a corresponding system of linear equations; and

solving the system of linear equations.

22. The computer-readable storage medium of claim 21, wherein solving the system of nonlinear equations involves using Gaussian Elimination.

23. An apparatus that computes interval parameter bounds from fallible measurements, comprising:

a receiving mechanism configured to receive a set of measurements $z_1, \ldots, z_n$, wherein an observation model describes each z_i as a function of a p-element vector parameter $\mathbf{x} = (x_1, \ldots, x_p)$;

a memory in a computer system for storing the set of measurements $z_1, \ldots, z_n$;

an equation forming mechanism configured to form a system of nonlinear equations $z_i - h(\mathbf{x}) = 0$ (i=1, …, n) based on the observation model; and

a solver configured to solve the system of nonlinear equations to determine interval parameter bounds on $\mathbf{x}$.

24. The apparatus of claim 23, wherein the system of nonlinear equations is an “overdetermined system” in which there are more equations than unknowns.

25. The apparatus of claim 23, wherein each measurement z_i is actually a q-element vector of measurements $\mathbf{z}_i = (z_{i1}, \ldots, z_{iq})^T$, and h is actually a q-element vector of functions $\mathbf{h} = (h_1, \ldots, h_q)^T$.

26. The apparatus of claim 23,

wherein the receiving mechanism is additionally configured to receive values for a set of conditions $c_1, \ldots, c_n$ under which the corresponding observations z_i were made; and

wherein equations in the system of nonlinear equations account for the conditions c_i and are of the form $z_i - h(\mathbf{x} \mid c_i) = 0$ (i=1, …, n).

27. The apparatus of claim 26, wherein each condition c_i is actually an r-element vector of conditions $\mathbf{c}_\mathrm{i} = (c_{i1}, \ldots, c_{ir})^T$.

28. The apparatus of claim 26, wherein each condition c_i is not known precisely but is contained within an interval c^{I}_i.

29. The apparatus of claim 26, wherein equations in the system of nonlinear equations are of the form $z_i - h(\mathbf{x} \mid c_i) + \varepsilon^{\mathrm{I}}(\mathbf{x}, c_i) = 0$ (i=1, …, n), which includes an error model $\varepsilon^{\mathrm{I}}(\mathbf{x}, c_i)$ that provides interval bounds on measurement errors for z_i.

30. The apparatus of claim 29, wherein if z_i is actually a q-element vector of measurements $\mathbf{z}_i = (z_{i1}, \ldots, z_{iq})^T$, then ε^{I} is actually a q-element vector $\boldsymbol{\varepsilon}^{\mathrm{I}} = (\varepsilon_1, \ldots, \varepsilon_q)^T$.

31. The apparatus of claim 29, wherein if there exists no solution to the system of nonlinear equations, the solver is configured to determine that at least one of the following is true:

at least one of the set of measurements $z_i, \ldots, z_n$ is faulty;

the observation model $h(\mathbf{x} \mid c_i)$ is false;

the error model $\varepsilon^{\mathrm{I}}(\mathbf{x}, c_i)$ is false; and

the computational system used to compute interval bounds on elements of $\mathbf{x}$ is flawed.

32. The apparatus of claim 23, wherein the solver is configured to:

linearize the system of nonlinear equations to form a corresponding system of linear equations; and to

solve the system of linear equations.

33. The apparatus of claim 32, wherein the solver is configured to solve the system of nonlinear equations using Gaussian Elimination.